



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
[www.uspto.gov](http://www.uspto.gov)

| APPLICATION NO.   | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO.   | CONFIRMATION NO. |
|---|-------------|----------------------|-----------------------|------------------|
| 10/637,193  | 08/08/2003  | Wolfgang Henke       | P2002,0659            | 3960             |
| 24131   | 7590        | 09/22/2006           | EXAMINER              |                  |
| LERNER GREENBERG STEMER LLP<br>P O BOX 2480<br>HOLLYWOOD, FL 33022-2480 |             |                      | CHACKO DAVIS, DABORAH |                  |
|   |             | ART UNIT             | PAPER NUMBER          |                  |
|   |             | 1756                 |                       |                  |

DATE MAILED: 09/22/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

|                              |                        |                     |  |
|------------------------------|------------------------|---------------------|--|
| <b>Office Action Summary</b> | <b>Application No.</b> | <b>Applicant(s)</b> |  |
|                              | 10/637,193             | HENKE ET AL.        |  |
|                              | <b>Examiner</b>        | <b>Art Unit</b>     |  |
|                              | Daborah Chacko-Davis   | 1756                |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on 30 June 2006.
- 2a) This action is FINAL.                    2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) 9-12 is/are withdrawn from consideration.
- 5) Claim(s) \_\_\_\_\_ is/are allowed.
- 6) Claim(s) 1-8 is/are rejected.
- 7) Claim(s) \_\_\_\_\_ is/are objected to.
- 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) All    b) Some \* c) None of:
1. Certified copies of the priority documents have been received.
  2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ .                                    |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ .  | 6) <input type="checkbox"/> Other: _____ .                        |

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-2, 5-8, are rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent No. 6,094,305 (Shiraishi) in view of U. S. Patent No. 5,673,103 (Inoue et al., hereinafter referred to as Inoue).

Shiraishi, in col 7, lines 54-67, in col 8, lines 1-64, in col 9, lines 28-67, in col 10, lines 1-32, in col 11, lines 1-14, and lines 55-64, discloses a method of using an illumination source in an exposure apparatus comprising a reticle stage, a mirror, a lens system, and a wafer placed on a wafer stage (substrate plane), providing a reticle that has an opaque layer on one side (chromium films), and aperture openings on the other side (slit, second side), illuminating the opaque layer (dielectric thin films) to form an interference pattern of the opening on the mask, imaging the interference pattern via a projection optical system and focusing and projecting the image onto the wafer and characterizing the illumination source (respective light components) based on the pattern image formed. Shiraishi, in col 5, lines 7-45, in col 16, lines 37-67, in col 17, lines 1-44, in col 22, lines 4-16, discloses determining the contrast of the interference fringes (interference pattern) from the image pattern formed on the wafer, estimating a contrast function (a variable "a") from the width of the openings (transmitting openings)

(distance between the slits), and the contrast determined, determining the intensity distribution of light based on a Fourier transform plane with respect to a pattern of the mask (claims 1-2, 5, and 8 ). Shiraishi, in col 7, lines 55-67, in col 11, lines 16-30, in col 16, lines 57-60, discloses determining the wavelength of the light generated by the illumination source, determining the NA of the optical system, performing illumination via a mask wherein the thickness of the opaque layer (pitch, thickness of the thin dielectric film), and the width (W) of the openings (slit width, and/or the distance between the openings) are adjusted such that ratio of i) the width to the pitch (thickness) or ii) the distance to the depth of the patterns in the mask is less than the wavelength employed (claims 6-7).

The difference between the claims and Shiraishi is that Shiraishi does not disclose that the opaque layer formed on the mask surface faces the illumination source.

Inoue, in col 13, lines 2-9, and in figure 13A, and 13B, discloses positioning a light shielding film (opaque layer) on the mask surface side facing the illumination source.

Therefore, it would be obvious to a skilled artisan to modify Shiraishi by positioning a light shielding film on the surface of the mask facing towards the illumination source because Inoue, in col 13, lines 10-221, discloses that applying the light shielding film prevents the phase difference occurrence of edge portions and thus avoids the formation of unnecessary dark portions.

3. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent No. 6,094,305 (Shiraishi) in view of U. S. Patent No. 5,673,103 (Inoue et al., hereinafter referred to as Inoue) as applied to claims 1-2, and 5-8, above, and further in view of U. S. Patent No. 4,885,232 (Spak).

Shiraishi in view of Inoue is discussed in paragraph no. 2.

Shiraishi, in col 1, lines 16-22, in col 18, lines 11-51, discloses that a positive photoresist coated wafer is photolithographically patterned (exposed, developed, exposed portions removed to form a pattern, recording of the image signal) (claim 3).

The difference between the claims and Shiraishi in view of Inoue is that Shiraishi in view of Inoue does not disclose that the height profile of the unexposed portions of the photoresist is subsequently measured with a microscope.

Spak, in col 7, lines 14-49, discloses that the surface profilometry of the patterned positive photoresist is observed through a microscope.

Therefore, it would be obvious to a skilled artisan to modify Shiraishi in view of Inoue by employing the method of measuring the wall profile of the patterned photoresist as taught by Spak because Spak , in col 7, lines 32-49, discloses that the microscope enables the observation of the micron size lines (pattern) at a magnification of 10,000 times, and enables comparisons of the different lines and their irregularities in slope or size produced at different exposure parameters.

4. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent No. 6,094,305 (Shiraishi) in view of U. S. Patent No. 5,673,103 (Inoue et al.,

hereinafter referred to as Inoue) as applied to claims 1-2, and 5-8, above, and further in view of U. S. Patent No. 6,699,628 (Shima).

Shiraishi in view of Inoue is discussed in paragraph no. 2.

The difference between the claims and Shiraishi in view of Inoue is that Shiraishi in view of Inoue does not disclose that a sensor is moved in the substrate plane during the imaging process (recording of the image signal) (claim 4).

Shima, in col 7, lines 45-58, in col 8, lines 20-35, discloses that during the exposure processing (imaging the wafer via a mask) an interferometer (a sensor, reference 18 of figure 1, detector) is positioned parallel to the wafer surface near the wafer stage (in the substrate plane).

Therefore, it would be obvious to a skilled artisan to modify Shiraishi in view of Inoue by employing the interferometer suggested by Shima because Shima, in col 8, lines 20-26, discloses that the interferometer positioned proximate the substrate stage enables the constant detection of the wafer stage in an X-Y plane at a resolution of about 0.01 $\mu$ .

### ***Response to Arguments***

5. Applicant's arguments with respect to claims 1-8, filed June 30, 2006, have been considered but are moot in view of the new ground(s) of rejection. See paragraph no. 2.

### ***Conclusion***

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daborah Chacko-Davis whose telephone number is (571) 272-1380. The examiner can normally be reached on M-F 9:30 - 6:00. If

attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark F Huff can be reached on (571) 272-1385. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

dcd

September 18, 2006.



JOHN A. MCPHERSON  
PRIMARY EXAMINER